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II. Solution by J. SCHEFFER, A. M., Hagerstown, Md.; M. A. GRUBER, A. M., War Department, Washington, D. C.; J. H. DRUMMOND, LL. D., Portland, Me.; ELMER SCHUYLER, B. Sc., Boys' High School, Reading, Pa.; COOPER D. SCHMITT, M. A., University of Tennessee, Knoxville, Tenn.; and H. S. VANDIVER, Bala, Pa.

Putting $xyzw=P$, the given equations change into the following :

$$P/z + P/y + P/x = a, \quad P/z + P/y + P/w = b,$$

$$P/z + P/x + P/w = c, \quad P/y + P/x + P/w = d.$$

Adding, we get $P/x + P/y + P/z + P/w = \frac{a+b+c+d}{3}$.

Putting $\frac{a+b+c+d}{3} = s$, and subtracting each of the above equations, gives

$$P/w = s - a, \quad P/x = s - b, \quad P/y = s - c, \quad P/z = s - d.$$

$$\text{Multiplying, } P^3 = (s-a)(s-b)(s-c)(s-d).$$

$$\therefore x = \sqrt[3]{\frac{(s-a)(s-b)(s-d)}{(s-c)^2}}, \quad y = \sqrt[3]{\frac{(s-a)(s-b)(s-d)}{(s-c)^2}},$$

$$z = \sqrt[3]{\frac{(s-a)(s-b)(s-c)}{(s-d)^2}}, \quad w = \sqrt[3]{\frac{(s-b)(s-c)(s-d)}{(s-a)^2}}.$$

GEOMETRY.

146. Proposed by H. R. HIGLEY, M. Sc., Professor of Mathematics, Normal School, East Stroudsburg, Pa.

If the opposite sides of a quadrilateral inscribed in a circle be produced to meet, the square on the line joining the points of concurrence=the sum of the squares on the two tangents from these points. Ex. 24, page 219, Mackay's *Elements of Euclid*.

Solution by G. B. M. ZERR, A. M., Ph. D., The Temple College, Philadelphia, Pa., and J. SCHEFFER, A. M., Hagerstown, Md.

Let $ABCD$ be the inscribed quadrilateral; E, F the intersection of the opposite sides produced; O the center of the circle; M the intersection of the diagonals; EG tangent from E ; FH , FL tangents from F .

Draw EF , EM and let EM cut FO in K . It has been shown that EM is the polar of F .

$\therefore EM$ passes through L, H and is perpendicular to OF .

$$\therefore EF^2 = FK^2 + FK^2.$$

$$\text{But } EK^2 = EO^2 - OK^2, \quad FK^2 = (FO - OK)^2.$$

$$\therefore FK^2 = FO^2 - 2FO \cdot OK + OK^2.$$

$$\text{But } 2FO \cdot OK = 2OH^2 = 2r^2. \quad \therefore EK^2 + FK^2 = EO^2 + FO^2 - 2r^2.$$

$$EG^2 = EO^2 - r^2, \quad FH^2 = FO^2 - r^2.$$

$$\therefore EG^2 + FH^2 = EO^2 + FO^2 - 2r^2 = EK^2 + FK^2 = EF^2.$$

